

CLAIMS

1. A fluid dispenser (1) for dispensing a metered volume of a fluid product (2) having:-
  - (a) a storage chamber (57) for storing the fluid product;
  - (b) a dispensing outlet (27) through which the fluid product is dispensable from the dispenser;
  - (c) a metering chamber (73) having:-
    - (i) an outlet (33) which places the metering chamber in fluid communication with the dispensing outlet;
    - (ii) a plurality of transfer openings (55a, 55b) through which the fluid product is transferable between the storage and metering chambers; and
    - (iii) a boundary wall structure (28, 43) which is cyclically movable between a first configuration, in which the transfer openings are open, and a second configuration, in which the transfer openings are closed, each cycle of movement which commences at, and ends in, the second configuration resulting in a metered volume of the fluid product being transferred from the storage chamber to the metering chamber via the transfer openings and dispensed from the dispensing outlet via the outlet; and
  - (d) an actuation mechanism (100) actuatable by a user of the dispenser to cause a cycle of movement of the boundary wall structure, the actuation mechanism adapted so as to dispose the boundary wall structure in the second configuration at the end of each cycle of movement caused thereby.
2. The dispenser of claim 1 in which the outlet is closed in the second configuration of the boundary wall structure.
3. The dispenser of claim 1 or 2 wherein the first and second configurations are expanded and contracted configurations, respectively.

4. The dispenser of claim 3 wherein the metering chamber defines a first internal volume in the expanded configuration and a second internal volume, which is less than the first internal volume, in the contracted configuration.
5. The dispenser of claim 4 wherein the second internal volume is zero or substantially zero.
6. The dispenser of any one of the preceding claims wherein the boundary wall structure has first and second wall structures movable relative to one another, the second wall structure being disposed in a first position relative to the first wall structure in the first configuration and in a second position relative to the first wall structure in the second configuration, the second position being closer to the first wall structure than the first position.
7. The dispenser of claim 6 wherein the first and second wall structures bear against one another in the second configuration.
8. The dispenser of claim 6 or 7 in which the outlet is provided in the first wall structure and/or the transfer openings are provided in the second wall structure.
9. The dispenser of any one of claims 6 to 8 wherein the second wall structure covers the outlet in the second position and/or the first wall structure covers the transfer openings in the second position.
10. The dispenser of any one of claims 6 to 9 wherein the outlet is provided in a section of the first wall structure against which the second wall structure bears when in the second position.
11. The dispenser of any one of claims 6 to 10 in which the first wall structure and the second wall structure are nestable in the second position.

12. The dispenser of any one of claims 6 to 11 wherein the first and second wall structures are movable relative to one another between the first and second positions in a forward-rearward direction.
13. The dispenser of claim 12 wherein the second wall structure forms a rear end of the metering chamber.
14. The dispenser of claim 12 or 13 in which the first wall structure forms a forward end of the metering chamber which has the outlet therein.
15. The dispenser of claims 13 and 14 wherein the rear end is nestable with the forward end in the second position.
16. The dispenser of any one of claims 12 to 15 wherein the first wall structure has a side section which extends generally in the forward-rearward direction, and the second wall structure is sealingly, slidably movable on the side section between the first and second positions.
17. The dispenser of claim 16 when appended to claim 14 or 15 wherein the side section extends forwardly from the forward end.
18. The dispenser of any one of claims 6 to 17 wherein the second wall structure is presented by a plunger-like member.
19. The dispenser of any one of the preceding claims in which the actuation mechanism has a biasing structure which biases the boundary wall structure to the second configuration.
20. The dispenser of claim 19 when appended directly or indirectly to claim 6 wherein the biasing mechanism biases the second wall structure to the second position relative to the first wall structure.

21. The dispenser of any one of the preceding claims further having a one-way valve which is positioned in a dispensing direction relative to the outlet and which only permits fluid flow therethrough in the dispensing direction.
22. The dispenser of any one of the preceding claims wherein the actuation mechanism is manually operable.
23. The dispenser of claim 22 wherein the actuation mechanism has an operating member which is engagable by a user to actuate the actuation mechanism.
24. The dispenser of claim 23 in which the operating member is finger-operable by the user.
25. The dispenser of claim 23 or 24 wherein the actuation mechanism is actuated in response to depression of the operating member into the dispenser.
26. The dispenser of any one of the preceding claims wherein the actuation mechanism is moved from a rest condition to an actuated condition on actuation thereof.
27. The dispenser of claim 26 having a biasing structure which biases the actuation mechanism to the rest condition.
28. The dispenser of claim 26 or 27 adapted such that at the end of each cycle of movement of the boundary wall structure the actuation mechanism is returned to its rest condition.
29. The dispenser of claims 25, 26 and 27 wherein the biasing structure biases the operating member outwardly.

30. The dispenser of any one of the preceding claims in which the dispensing outlet is in a nozzle, optionally adapted for insertion into a nostril of a user or configured as a mouthpiece, and through which the dispenser, in use, dispenses.

31. The dispenser of any one of the preceding claims which is hand-held.

32. The dispenser of any one of the preceding claims wherein when the boundary wall structure is moved in a first phase of the cycle of movement from the second configuration to the first configuration the metered volume is transferred from the storage chamber to the metering chamber and when the boundary wall structure is returned from the first configuration to the second configuration in a second phase of the cycle the metered volume is dispensed from the dispenser.

33. The dispenser of any one of the preceding claims adapted such that an excess volume of the fluid product, comprising the metered volume and a surplus volume, is transferred to the metering chamber from the storage chamber in the cycle of movement of the boundary wall structure and the dispenser is further provided with a bleed arrangement adapted to bleed the surplus volume from the metering chamber so that only the metered volume is dispensed from the dispenser.

34. The dispenser of claims 32 and 33 wherein the excess volume is transferred to the metering chamber in the first phase and the surplus volume is bled in the second phase.

35. The dispenser of claim 33 or 34 wherein the bleed arrangement is configured to bleed the surplus volume back to the storage chamber.

36. The dispenser of claim 35 adapted such that the surplus volume is bled back to the storage chamber via the transfer openings.

37. The dispenser of any one of the preceding claims containing the fluid product.

38. The dispenser of claim 37 in which the fluid product is a medicament.

39. The dispenser of claim 21 or any claim appended thereto in which the one-way valve is located in the outlet.

40. The dispenser of any one of the preceding claims in which the metering chamber has an inlet port through which the metering and storage chambers are able to be placed in fluid communication and further in which there is an inlet valve mechanism associated with the inlet port for selectively opening and closing the inlet port, wherein the inlet valve mechanism is adapted to open the inlet port when the metering chamber moves from the second configuration to the first configuration.

41. The dispenser of claim 40 in which the inlet valve mechanism is a one-way valve which only permits fluid flow in the direction from the storage chamber to the metering chamber.

42. The dispenser of claims 40 or 41 adapted such that the inlet valve mechanism opens the inlet port in an initial phase of movement of the metering chamber from its second configuration to its first configuration.

43. The dispenser of any one of claims 40 to 42 adapted such that on opening of the inlet port on movement of the metering chamber from its second configuration to its first configuration the open inlet port is the sole flow path for the fluid product to enter the metering chamber from the storage chamber.

44. The dispenser of any one of claims 40 to 43 adapted such that on movement of the metering chamber from its second configuration to its first configuration the inlet port is opened by the inlet valve mechanism before the transfer ports are opened.

45. A fluid dispenser (1) for dispensing a metered volume of a fluid product (2) having:-

- (a) a storage chamber (57) for storing the fluid product;
- (b) a dispensing outlet (27) through which the fluid product is dispensable from the dispenser;
- (c) a metering chamber (73) having:-
  - (i) an outlet (33) which places the metering chamber in fluid communication with the dispensing outlet;
  - (ii) a plurality of transfer openings (55a, 55b) through which the fluid product is transferable between the storage and metering chambers; and
  - (iii) a boundary wall structure (28, 43) which is cyclically movable between a first configuration and a second configuration, each cycle of movement resulting in an excess volume of the fluid product, comprising the metered volume and a surplus volume, being transferred from the storage chamber to the metering chamber via the transfer openings and the metered volume being dispensed from the dispensing outlet via the outlet; and
- (d) a bleed arrangement adapted to bleed the surplus volume from the metering chamber so that only the metered volume is dispensed from the dispenser.

46. A dispenser unit having a dispenser according to any one of the preceding claims in which the dispensing outlet is a dispensing outlet of the unit through which the metered volume of the fluid product is, in use, dispensed to the external environment.

47. A device unit having a dispenser according to any one of claims 1 to 45, wherein the dispensing outlet is an internal outlet of the unit through which, in use, the metered volume of the fluid product is dispensed into the unit.

48. The device unit of claim 47 further having a dispensing outlet which opens to the external environment about the unit and means for conveying the fluid product dispensed through the internal outlet to the external environment through the dispensing outlet.

49. The device unit of claim 48 in which the conveying means is such as to change the state of the fluid product.

50. The device unit of claim 48 or 49 in which the conveying means has a vibrating element to aerosolise a liquid dispensed by the dispenser.

51. The device unit of claim 50 in which the vibrating element is a piezoelectric element.

52. A fluid dispenser substantially as hereinbefore described with reference to, and as illustrated by, Figures 1 to 3, Figures 1 to 4, Figures 1 to 3 and 5 or Figures 1 to 5 of the accompanying drawings.